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Male Infertility: An Update

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The study of sperm is the cornerstone of determining a man's reproductive potential. Despite its appearance, it is a complicated set of tests with extremely variable outcomes that are open to interpretation. The semen analysis is used to determine a couple's reproductive potential and to help the clinician manage their infertility. The World Health Organization's (WHO) Infertility Task Force has spent the last 40 years attempting to standardize the methods of sperm examination in order to bring uniformity and significance to the test. The "Laboratory Manual for the Examination and Processing of Human Semen" was published for the first time in 1980. Since then, the WHO manual has been updated four times, each time seeking to reflect world male population demographics and address restrictions. The WHO manual's 5th version, issued in 2010, is currently in use around the world and is considered one of the most widely used, yet contentious, documents in the field of male infertility.

The WHO published a draft of the 6th version of its handbook for public comment and suggestions in March 2021 (https://www.who.int/publications/i/item/9789241547789). The new handbook is divided into three sections: sperm testing, preparation and cryopreservation of sperm, and quality control and assurance. Basic (regular) examinations, extended examinations (which may be utilized by laboratories or physicians in particular conditions), and advanced testing are all processes for semen examination (these have not been currently recommended for general use and are primarily indicated for research purposes).

The basic examination is provided in the 6th edition in a step-by-step and temporal manner, allowing it to be exactly replicated in any laboratory with the necessary equipment and experience. The parts on advanced and extended examinations have been fully rewritten to reflect current clinical practice. The introduction of decision limits to distinguish normal from pathological ejaculates is the most significant change proposed in the 6th edition. The editors of the 6th edition admit that the reference ranges described in the 5th edition should be dropped because they are ineffective in distinguishing between fertile and infertile males.

The introduction of the "decision limitations" approach is an attempt to underline that the aim of the semen examination is to determine next steps in terms of further evaluation and treatment, not to label a man as fertile or infertile. The existing boundaries are arbitrary, and future research with clinical results in other populations will help refine them. Many males whose samples would have previously been designated as normal using the 5th edition criteria will now be classed as "borderline" and be eligible for therapeutic interventions as a result of the introduction of a "borderline" category. In some circumstances, clinicians can still give hope for a natural pregnancy before recommending ART. The ramifications of this classification change in clinical practice is likely to be substantial. If we use the new standards and consider men infertile if their parameters fall below the new "normal" threshold ("borderline"+"pathological"), the number of infertile men in our offices will skyrocket.

The decision to delete the reporting of rapid progressing motility was a point of contention in the 5th edition, and the editors of the 6th edition have now reverted to a four-category classification.

Multiple stages of reproductive function were disrupted by sperm abnormalities, including DNA fragmentation, including fertilization, embryo development, implantation, and pregnancy.

"Intra-cytoplasmic, or single sperm injection in an egg for fertilization, often known as ICSI, is a commonly used assisted reproduction technique that has helped many men overcome sperm quantity, motility, and morphological problems." However, some sperm characteristics still have an impact on the chances of fertilization and pregnancy.

"Obstructions, injury, or medication can result in Sperm DNA fragmentation after the sperms are out of the testis. In one large research of couples who underwent multiple IVF cycles, testicular sperm produced a clinical pregnancy rate of 28%, compared to 10% for ejaculated sperm.

Male obesity reduces clinical pregnancy and live birth rates in assisted reproductive technologies, regardless of female weight or other identified factors." This outcome progressed from normal male weight to overweight, obese, and morbidly obese, according to a meta analysis of important research to far.

Paternal age can have a significant impact on offspring's health as well as IVF outcomes. Although he observed differences between research, one significant study found a two-fold greater probability of failed assisted reproduction conception when the male partner was 40 or older.

"Male age, particularly above 40 years, is linked to a 40% increase in the likelihood of miscarriage and other negative consequences such as birth abnormalities, pediatric cancer, autism, and schizophrenia."

Sperm selection could play a key role in generating greater live birth rates in ART cycles, particularly in cases when the male factor is present. The approaches devised to date, however, have not proven to be useful in ordinary clinical

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practice and appear to be effective primarily in select cases of male infertility. Some of the novel methods, which are based on physiological selection in vivo and microfluidic environments, have shown promising findings that have yet to be verified in large trials in clinical practice. These investigations should be randomized and rigorous in their comparison of outcomes using sperm samples of various qualities, with the female factor minimized. It may be required to combine different sperm selection strategies to get the best results.

Increased Digital Analysis to Improve Society's Reproductive Health. It's not just about sperm selection and getting higher pregnancy rates with AI fertility treatment so much more can be accomplished. Experts can now use selective AI to examine the father's DNA quality and treat male reproductive health concerns, as well as provide early detection of potential genetic abnormalities that could be passed down from the father to the infant. These steps might potentially alert fertility treatment patients to any hereditary health risks, address miscarriage concerns, and even change personal health practices to help them become parents more quickly.

Science is evolving rapidly and we now have to come up with ways to effectively use the upcoming technologies into making ART safer and improve upon the existing live birth rates without increasing the cost burden to the patients.

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